CLAIMS

I claim:

1. A method for environmental monitoring and bioprospecting for microorganisms within a specified environment, said method comprising the steps of:

locating a testing device in said environment,

wherein said device including a container having a fluid inlet and outlet, said container configured for entry, in situ use and exit from said environment, a plurality of capillary microcosms situated within said container, each of said capillaries having a capillary inlet and outlet that are configured so as to allow for fluid flow through said capillaries, each of said capillaries further having a means for covering said capillary inlet and outlet so as to prevent flow through said capillary,

placing in at least one of said capillaries a means for fostering the collection of microorganisms that are indigenous to said surrounding environment when fluid from said surrounding environment is allowed to flow through said capillary,

opening said capillary covering means so as to allow fluid from said surrounding environment to flow though said container and capillaries,

leaving said device in said environment for a temporal duration sufficient to study phenomena occurring within said capillary microcosms,

retrieving said testing device, and

analyzing phenomena occurring within said capillary microcosms.

2. A method as recited in Claim 1 wherein said device further including a pump connected to said container, said pump being configured so as to cause the flow of fluid from said surrounding environment into said container inlet and through said capillaries, a means for collecting said fluid that flows through said capillaries, and a check valve connected downstream of said container to prevent the backflow of said fluid into said container.

3. A method as recited in Claim 1 wherein said plurality of capillaries being configured so as to allow for automated analysis of said capillaries using commercially available robotics.

4. A method as recited in Claim 2 wherein said plurality of capillaries being configured so as to allow for automated analysis of said capillaries using commercially available robotics.

5. A method as recited in Claim 1 wherein said plurality of capillaries being configured in the form of rapidly, exchangeable microtiter plates.

6. A method as recited in Claim 2 wherein said plurality of capillaries being configured in the form of rapidly, exchangeable microtiter plates.

7. A method as recited in Claim 5 wherein the content of said microtiter plates being lyophilized and vacuum sealed.

8. A method as recited in Claim 6 wherein the content of said microtiter plates being lyophilized and vacuum sealed.

9. A method as recited in Claim 1, further comprising the step of:

before locating said device, placing in at least one of said capillaries a means for containing a specified test substance that can diffuse into the fluid flowing through said capillary.

10. A method as recited in Claim 2, further comprising the step of:

before locating said device, placing in at least one of said capillaries a means for containing a specified test substance that can diffuse into the fluid flowing through said capillary.

11. A method as recited in Claim 3, further comprising the step of:

before locating said device, placing in at least one of said capillaries a means for containing a specified test substance that can diffuse into the fluid flowing through said capillary.

12 A method as recited in Claim 4, further comprising the step of:

before locating said device, placing in at least one of said capillaries a means for containing a specified test substance that can diffuse into the fluid flowing through said capillary.

13. A method as recited in Claim 1, further comprising the step of:

before locating said device, configuring a capillary microcosm so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said capillaries having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said capillaries is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said capillaries is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said capillaries,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said capillary microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms

having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

14. A method as recited in Claim 2, further comprising the step of:

before locating said device, configuring a capillary microcosm so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said capillaries having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said capillaries is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said capillaries is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said capillaries,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said capillary microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk

assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said

microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

15. A method as recited in Claim 3, further comprising the step of:

before locating said device, configuring a capillary microcosm so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said capillaries having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said capillaries is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said capillaries is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said capillaries,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said capillary microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said

microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm

covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

16. A method as recited in Claim 4, further comprising the step of:

before locating said device, configuring a capillary microcosm so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said capillaries having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said capillaries having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said capillaries is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said capillaries is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said capillaries,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said capillary microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

17. A testing device for environmental monitoring and bioprospecting for microorganisms within a specified environment, said device comprising:

a means for providing a plurality of physically separated, test microcosms that are so configured as to allow for fluid flow through said microcosms,

a means for containing and protecting said test microcosms as they are placed in said environment, said means further providing for the flow of fluid from said surrounding environment to enter and flow through said microcosms, and

a means for covering said fluid flow paths through said microcosms so as to regulate the flow through said microcosms.

18. A testing device as recited in Claim 17:

wherein said plurality of microcosms being configured so as to allow for automated analysis of said microcosms using commercially available robotics.

19. A testing device as recited in Claim 17, further comprising:

a means for causing fluid flow from said surrounding environment and through said microcosms,

a means for collecting and retaining said fluid flowing through said microcosms, and

a means downstream from said microcosms for preventing backflow of said fluid into said microcosms.

20. A testing device as recited in Claim 18, further comprising:

a means for causing fluid flow from said surrounding environment and through said microcosms,

a means for collecting and retaining said fluid flowing through said microcosms, and

a means downstream from said microcosms for preventing backflow of said fluid into said microcosms.

21. A testing device as recited in Claim 17 further comprising a means in at least one of said microcosms configured for fostering the collection of said microorganisms that enter said microcosm.

22. A testing device as recited in Claim 18 further comprising a means in at least one of said microcosms configured for fostering the collection of said microorganisms that enter said microcosm.

23. A testing device as recited in Claim 19 further comprising a means in at least one of said microcosms configured for fostering the collection of said microorganisms that enter said microcosm.

24. A testing device as recited in Claim 20 further comprising a means in at least one of said microcosms configured for fostering the collection of said microorganisms that enter said microcosm.

25. A testing device as recited in Claim 17 wherein at least one of said microcosms having a means for containing a specified test substance that can diffuse into the fluid flowing through said microcosm.

26. A testing device as recited in Claim 18 wherein at least one of said microcosms having a means for containing a specified test substance that can diffuse into the fluid flowing through said microcosm.

27. A testing device as recited in Claim 19 wherein at least one of said microcosms having a means for containing a specified test substance that can diffuse into the fluid flowing through said microcosm.

28. A testing device as recited in Claim 20 wherein at least one of said microcosms having a means for containing a specified test substance that can diffuse into the fluid flowing through said microcosm.

29. A testing device as recited in Claim 17 wherein said plurality of test microcosms being configured in the form of a rapidly, exchangeable microtiter plate.

30. A testing device as recited in Claim 18 wherein said plurality of test microcosms being configured in the form of a rapidly, exchangeable microtiter plate.

31. A testing device as recited in Claim 19 wherein said plurality of test microcosms being configured in the form of a rapidly, exchangeable microtiter plate.

32. A testing device as recited in Claim 20 wherein said plurality of test microcosms being configured in the form of a rapidly, exchangeable microtiter plate.

33. A testing device as recited in Claim 29 wherein the content of said microtiter plate being lyophilized and vacuum sealed.

34. A testing device as recited in Claim 30 wherein the content of said microtiter plate being lyophilized and vacuum sealed.

35. A testing device as recited in Claim 31 wherein the content of said microtiter plate being lyophilized and vacuum sealed.

36. A testing device as recited in Claim 32 wherein the content of said microtiter plate being lyophilized and vacuum sealed.

37. A testing device as recited in Claim 17, wherein a test microcosm configured so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said microcosms having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said microcosms is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said microcosms is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said microcosms,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said

microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm

covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

38. A testing device as recited in Claim 18, wherein a test microcosm configured so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said microcosms having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said microcosms is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said microcosms is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said microcosms,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

39. A testing device as recited in Claim 19, wherein a test microcosm configured so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said microcosms having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said microcosms is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said microcosms is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said microcosms,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

40. A testing device as recited in Claim 20, wherein a test microcosm configured so as to aid in addressing research interests chosen from the group consisting of:

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with SIP,

the identification and linking of the microbial function occurring in said environment to phylogeny, wherein at least one of said microcosms having placed therein an isotope labeled test compound that can be used in conjunction with mass spectrometry,

the survival in said environment of a specified microorganism, wherein at least one of said microcosms having placed therein said specified microorganism,

the fate in said environment of a specified, genetically engineered microorganism, wherein at least one of said microcosms is configured to contain said genetically engineered microorganism,

the fate in said environment of a specified pathogen, wherein at least one of said microcosms is configured to contain said pathogen,

for a specified process in said environment, the effectiveness of specified, varying test substances for their ability to accelerate said process, wherein said test substances are added to said microcosms,

the identification of microorganisms indigenous to said environment that are responsible for a desired bioremediation process in said environment,

the effectiveness of said varying bioremediation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioremediation strategies,

the effectiveness of said varying bioaugmentation strategies for said environment, wherein said microcosms are configured to be representative of said varying bioaugmentation strategies,

the effectiveness of said varying chemical treatment strategies for said environment, wherein said microcosms are configured to be representative of said varying chemical treatment strategies,

the intrinsic transformation rates in said environment when said environment is contaminated with a specified contaminant,

the enhanced transformation rates in said environment when said environment is contaminated with a specified contaminant, wherein specified nutrients are added to said microcosms,

the analysis of the microbial community indigenous to said environment,

the proteomic analysis of the microbial community indigenous to said environment,

the discovery within said environment of novel microorganisms of potential commercial value,

the discovery within said environment of novel biochemical processes of potential commercial value,

the discovery within said environment of novel natural products of potential commercial value,

the normalization of the test results achieved with said device for differences between when and where said tests are conducted, wherein at least one of said microcosms is configured to serve as an internal standard to which said results can be normalized,

the means for enhancing the signal-to-noise ratio in the mass spectrometric analysis of a specified microorganism, wherein at least one of said microcosm configured to foster the growth of said microorganism while limiting the growth and survival of other, non-specified microorganisms,

the determination of the fate of a specified compound in said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the effect of a specified compound on the microbial community of said environment for the purpose of chemical risk assessment, wherein at least one of said microcosms having placed therein said compound,

the determination of the fate of a specified microorganism for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said microorganism,

the determination of the effect of a specified microorganism on the microbial community of said environment for the purpose of biological risk assessment, wherein at least one of said microcosms having placed therein said specified microorganism,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental treatment purposes of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent, said placement being such that said agent is retrievable from said microcosm,

the determination, for environmental monitoring purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for risk assessment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environment treatment purposes, of the effect of a specified agent in said environment, wherein at least one of said microcosms having placed therein said agent and said device being configured such that said fluid from the surrounding environment that comes into contact with said agent in said microcosm is retrievable,

the determination, for environmental monitoring purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for risk assessment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the determination, for environmental treatment purposes, of the effect of a specified biochemical process in said environment, wherein said microcosm covering means being configured so that the duration of said process in said microcosm is controllable,

the elucidation of the in situ metabolic activity of a specified microorganism, wherein at least one of said microcosms having placed therein an isotope labeled test compound which is to be analyzed for the ratio of light (non-labeled) and heavy (labeled) biomarkers of said microorganism, or

the detection of a specified microorganism in said environment, wherein at least one of said microcosms having placed therein a test compound suitable for increasing the signal-to-noise ratio of a characteristic biomarker of said microorganism during mass spectrometric analysis following in situ biomarker amplification.

41. A testing device as recited in Claim 17, further comprising a means for remotely controlling the operation of said means for covering said microcosm fluid flow paths.

42. A testing device as recited in Claim 18, further comprising a means for remotely controlling the operation of said means for covering said microcosm fluid flow paths and said means for causing fluid flow through said microcosms.

43. A testing device as recited in Claim 19, further comprising a means for remotely controlling the operation of said means for covering said microcosm fluid flow paths.

44. A testing device as recited in Claim 20, further comprising a means for remotely controlling the operation of said means for covering said microcosm fluid flow paths and said means for causing fluid flow through said microcosms.